
# The liberalization of the natural gas retail market in Greece

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A thesis submitted for the degree of

*Master of Science (MSc) in Energy Systems*

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THESSALONIKI – GREECE


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# ABSTRACT

The current thesis explores the possible consequences of the compliance of Greek natural gas market with the European legislation, proposed by the Greek Third Bailout Package of August 2015. The transformation of the EU energy systems is largely based on the use of gas for power production, while there is an increasing dependence on external suppliers. The new law (4336/2015) provides for the abolishment of the existing exclusive rights of the distribution companies (EPAs) to supply and operate their respective distribution systems. The supply of Eligible Customers by the EPAs will not be regulated in terms of prices, while it will need to comply with the provisions of a supply license and a supply code approved by the Regulatory Authority for Energy. While the theoretical background for the liberalization includes low gas price and cost reduction at the companies operating on the gas market as its goals, the experience of the gas price rises in the late 2000s, after the reforms were partially or fully implemented in other EU countries, and the quick rate in which the policies proposed have to be implemented, stand in front of the success of the measures included in the Package.

Theodoros Yfantidis

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# 1. NATURAL GAS IN EUROPE

## 1.1. Natural Gas European Market

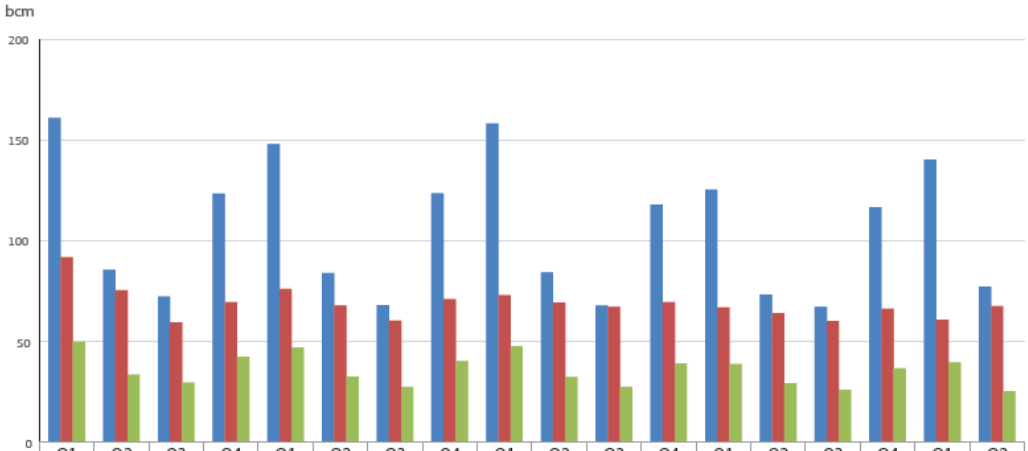
"It is clear today that at least for the next 20 years, natural gas will be a key energy vector for Europe, although since the economic crisis, gas consumption rates have fallen (Figure 1). Since 1996, gas is the second primary energy source for Europe after oil, accounting for a quarter of total consumption. In certain countries, like Germany, Italy, United Kingdom or Spain, gas consumption has been rising since the 1980s; only in France, among the larger economies, has its share remained steady at a little over 10%. The reasons behind the rise in gas consumption and the related infrastructure investment, are generally based on the following factors" (Gilardoni, 2008):

**1. Economic.** "The economic determinants are related to the more efficient electricity production processes; CCGT plants (the most widely used technology) can achieve at least 55–60% efficiency compared with 35–40% for traditional thermal plants. Given the gas prices up to 2004, gas was an economic way to produce electricity; now, after the price increases seen in the years 2005–2007, other vectors are less expensive, though the situation can vary from company to company and country to country. Last but not least, the lower emission levels associated with gas mean that there is no obligation to purchase both green and grey certificates, with evident savings in the overall cost of production."

**2. Environmental.** "The environmental factors are mainly related to atmospheric emissions. While emissions are not zero, they are certainly lower than the corresponding releases of other vectors like oil or coal. In Europe, the emissions intensity of carbon dioxide ($CO_2$), sulphur dioxide ($SO_2$) and nitrogen oxides ($NO_x$) from conventional thermal power plants have decreased substantially since 1990, particularly in the case of $SO_2$ and $NO_x$. This is primarily due to a decline in the use of coal, and the replacement of old, inefficient coal plants with newer or gas-fired ones. Rising overall electricity consumption has acted to partly offset the environmental benefits from improvements in emissions intensity. While $CO_2$ intensity has decreased, $CO_2$ emissions increased in real terms by around 8% between 1999 and 2004."

Following the above mentioned aspects, in specific countries (such as Italy with the so-called Cip 6) the construction of gas-fired plants was subsidized, with the result of an even stronger push to changeover away from filthy carriers.

"The consequence is that, today, one third of European gas consumption is for power generation. From 2000 to 2010 the use of gas for this purpose was doubled, having reached an annual 200 bcm. Italy and Spain are the recent leaders in the race for gas, but Germany and UK were already present in this sector in the late 1990s and they are now heavy consumers" (Gilardoni, 2008).




| | Q1 2011 | Q2 2011 | Q3 2011 | Q4 2011 | Q1 2012 | Q2 2012 | Q3 2012 | Q4 2012 | Q1 2013 | Q2 2013 | Q3 2013 | Q4 2013 | Q1 2014 | Q2 2014 | Q3 2014 | Q4 2014 | Q1 2015 | Q2 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Consumption | 161 | 86 | 72 | 123 | 148 | 84 | 68 | 124 | 158 | 84 | 68 | 118 | 125 | 73 | 67 | 117 | 140 | 77 |
| Net imports | 92 | 76 | 60 | 70 | 76 | 68 | 60 | 71 | 73 | 69 | 67 | 70 | 67 | 64 | 60 | 66 | 61 | 68 |
| Production | 50 | 34 | 30 | 43 | 47 | 33 | 28 | 40 | 48 | 32 | 28 | 39 | 39 | 29 | 26 | 37 | 40 | 25 |

**Figure 1.1.** Natural gas consumption, net imports and production in EU-27, 2011-2014 (Eurostat, 2015).

European gas market evolved to a more dynamic one during the past years as a consequence of supply and demand developments. Due to the economic crisis, gas consumption has decreased, gas origin changed massively, and as a result Europe moved closer to international gas markets. In the past two years imports of gas pipelines have declined, while imports of liquefied natural gas (LNG) advanced to 11 billion cubic meters (bcm) in 2009 and 18 bcm in 2010. In between 2008 and 2010, long-distance pipeline gas (LDPG) lost an amount of 10 billion cubic meters, a fact that reflects a market proportion loss of approximately 2%.

It is a common belief that this volatility derived from an excess of LNG supply, which led to cheap spot market prices. Which is the cause of the excess

supply of LNG? Three factors: a decrease of natural gas demand due to economic crisis; a decrease of U.S. natural gas demand as a result of shale gas boost; and new LNG sufficiency that evolved in Qatar.

Global natural gas markets are evolving, mainly because of the exploration of shale gas in North America. Liquefied natural gas (LNG) turned markets progressively more global since transportation cut off significantly from pipelines. New resources around or from Europe such as shale gas and other unusual sources grew to main suppliers. Along with internal market diversification, these evolutions could ease concerns about dependency on natural gas imports. However, due to the new phase of natural gas exploration it is still hazy when these unconventional resources will turn compelling. As conventional natural gas production minimizes, Europe will inevitably depend more and more on substantial gas imports in addition to its own natural gas production and possible domestic shale gas exploitation. "During the next few years, as European gas prices decrease, producers and importers have an opportunity to brace for the expected bust by adjusting now for the coming shifts. Regional suppliers and municipal utilities should also anticipate tougher competition in the years ahead. Those who want to come out on top must transform their existing business models" (ATKearney, 2011; EU, 2011).

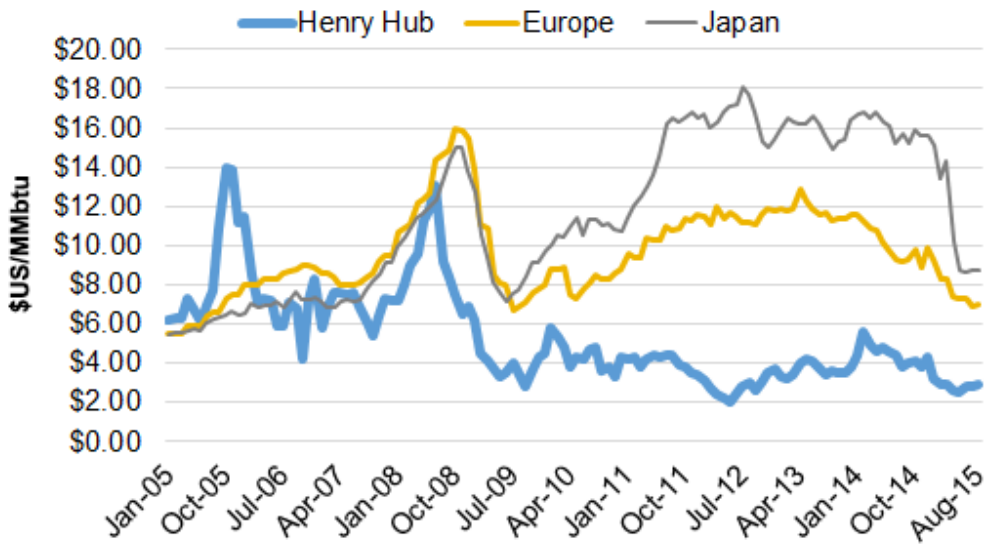



**Figure 1.2.** Monthly nominal natural gas prices (US Henry Hub, Europe, Japan, 2005-2015 (August) (NGI's Bidweek Survey & World Bank, 2015).

## 1.2. The Case for the Liberalization of Natural Gas Markets

In any economic zone, a variety of transactions happens, compromising of various transactions of goods and services. Gas markets in the European continent rely on plurality of transactions. Applying the transaction cost scheme to gas markets depends upon spotting the most suitable business deals and their governance modes. The swap of natural gas and associated services takes place through numerous forms of deals, which structure the transactions through the gas value chain, while diverse modes of governance apply. "Some are related to spot market trading and are organised in the form of a market. Other contracts are bilateral and show a hybrid mode of governance. Historically, European natural gas imports were based on long-term take-or-pay contracts including a destination clause which prohibited re-export of imported gas" (Neumann and von Hirschhausen, 2005). "Another variant of bilateral contracts are inter-firm 'over-the-counter' (OTC) deals on the wholesale level. OTC is the term used to describe trades which are customised confidentially between the parties concerned – in contrast to open-market trades which are standardised and priced transparently" (Wright, 2006). Different contract forms set the baselines of the access to the distribution or transmission networks. The package of contracts describing these transactions is also called the tariff system and balancing regime. "On the retail side, consumer end-user contracts determine the terms of conditions applied. Depending on the consumer group, contracts and their modes of governance vary. Whereas companies organise their transactions with residential consumers in the form of classical contracts, industrial consumers tend to apply neoclassical contract law in order to accommodate flexibility in demand and supply changes. Natural gas markets fall within the group of network industries. A significant factor is that the exchange of gas and related services requires a gas network, import facilities (LNG terminals, regasification plants) and, on the production side, export (pipelines, a liquefaction entity and LNG export terminals) and production (upstream) facilities. In the context of the European gas market reform, the network for gas transport is subjected to reform and therefore of most significance. To a certain extent, transactions and their attributes within a sector resemble one another. Based on this, we argue that a portfolio of a sufficient number of identical, or very similar, transaction attributes allows one to use a sector argument here. Below, these attributes will be evaluated with regard to asset-specificity, uncertainty and frequency" (Haase, 2009).

It is commonly accepted that asset-specificity refers to the relative inability to transfer assets meant for a specific use in a certain transaction to other uses. It is presumed that extremely unique assets serve as sunk costs that have relatively little importance beyond their use in the context of a specific transaction. Glachant (2002) considers that four of the six variants of asset specificity outlined above are most relevant when analysing network industries.

It must be noted that site specificity influences gas transport and natural gas production assets. This kind of assets are stable, their set-up or relocation costs are immense and, therefore, relocation is not a feasible option. Once a network is implemented, this particular asset will be needed for one and single purpose. "Some authors claim site specificity can be reduced by the attribution of access and connection rights, or by the regulated construction of additional facilities". Parallel pipeline systems are occasionally budgetary as the capacity demand is not frequently plentiful to explain an additional pipeline. While third party access can minimize site particularity, it may not reduce to the same way the incumbent's desire to vertically combine every part of the gas value chain commencing with production, via transportation, storage and processing to consumer supply.

"The degree of dedicated asset specificity depends heavily on the individual relationship. There are certainly transactions between large industrial users and gas companies for which dedicated pipelines exist; meaning that the pipeline connection between the two companies is exclusive. If the industrial user decides to switch fuels from natural gas to say coal, then the pipeline becomes unnecessary and the asset owner is faced with a stranded asset. In other words, the extent of dedicated asset specificity depends on the network characteristics in relation to the consumer base. However, production and transport facilities often enjoy a broader consumer base. Overall, dedicated specificity is, on average, somewhat semi-specific in gas markets" (Haase, 2009).

Physical and materialistic particularities are also applicable. Before the EU gas reform, networks were not initially structured for adjustable commerce within Europe. Concerning physical specificity, operability from many different players of natural gas grids has been crucial. Physical specificity even nowadays demonstrates a significant role in minimizing harmonisation barriers. As an example, different gas

qualities enforce problems of technical nature. Glachant (2002) specifically says that "physically specificity can be neutralised by the regulatory establishment of interoperability standards and norms, or via a legal obligation to ensure entry- and exit-points linking interconnection flows". Even though the Third Energy Package (2009) tries to implement a common European grid code this has not been able until now. Narrow natural gas storage abilities are still a challenge for a proper management of gas flows which are crucial in order to balance supply with demand. Each step taken in order to accommodate many different players, implied by market liberalization, perplexes the gas flow management and boosts temporal specificity. Glachant notes in this respect "temporal specificity can be attenuated by designating an accredited controller to synchronise the flows". "A transmission system operator can reduce but not remove the temporal specificity that characterizes gas transport. European gas markets thus continue to demonstrate high physical and temporal specificities" (Haase, 2009).

Brand-name capital and human asset specificities are, according to Glachant, low. "Although natural gas differs in quality by origin and by trader, it is certainly not a commodity comparable with branded products. Gas companies do not generate capital on the basis of their brand but by their geographical availability." Haase (2009) states that "human asset specificity has some relevance for the gas sector. Highly educated staff are required to handle the network, be it to balance gas flows or to trade gas on the wholesale level. In comparison, the transport of gas requires much more sector- and asset- specific knowledge than, for instance, milk. Before liberalization, only a very few people had access to the details of the gas network and tariffs. At that time, gas flows, capacities, in- and out- take points were strategic knowledge. Later, the reform aimed to broaden the knowledge base through the help of a set of third-party access measures. The availability of a sufficient number of specifically trained people such as engineers with expertise in oil and gas projects is crucial. Whereas exploration, production, construction and maintenance areas face difficulties in attracting certain technical staff in sufficient numbers, and at reasonable cost, other branches of the business do not face shortages. However, since the current shortage of staff might be only a cyclical problem, we consider European gas markets to be moderate in terms of human specificity. To sum up, there are ways in which certain specificities can be reduced at the expense of higher transaction costs. The

European Unions' attempt to establish a European grid code, and to harmonise balancing markets, may be seen as an effort to reduce physical and temporal specificities. This effort necessitates greater collective coordination and monitoring. The most significant asset specificity in terms of characterising transactions in European gas markets is site specificity. Investments in transmission and distribution networks, storage and in gas production and exploration remain highly site specific. The provision of capital for these investments is dependant on whether exposure to potential hazards can be safeguarded against, for instance by agreeing long-term supply contracts."

For this reason, Haase (2009) argues that "contract flexibility has its limitations. Contract flexibility involves at least three dimensions: long term versus short term, small volume versus large volume, and the agreed price parameter. Given the site specificity, any investing party has to accommodate price, volume and time risks. In opting for a market-based mode of governance, rather than a hierarchical form involving vertically integrated companies, a dilemma related to collective action is added" (Haase, 2009).

The frequency of gas sector transactions may vary significantly depending on the type of transaction. Nonetheless, transactions which deal with natural gas trading and transport do happen frequently. Alterations of the environment or unpredictable behavioral changes by the gas chain players may produce uncertainty. Environmental uncertainty in the European gas markets is usually referred to evolutions that may affect supply and demand. Despite of the existence of multiple and complicated supply and demand models, geopolitical, political or economic changes may dramatically diversify the whole picture. Restructure of the energy sector after the oil crisis during 1975 makes a very good example. Each company and country has to make sure that purchased gas volumes have to be delivered at the agreed price. Energy price volatility is a huge environmental anxiety since natural gas prices are linked to oil prices. Behavioral uncertainty also plays a major role. The literature mainly refers to the bond between the investing companies and the regulatory authority. "Companies face the threat that, after they have made huge investments in production or network facilities, the regulatory authority could change the regulatory framework in such a way that the investment fails to provide an adequate return. Once the firm has made the investment, it is effectively locked into a contract with the

regulator and thus runs the danger that the investment fails to return a profit. Transaction cost economics would view the regulator as behaving opportunistically if it changed the rules of the game or the contract *ex post* in its favor because the company is dependent and locked in by its investment. This specific form of uncertainty is also referred to as regulatory uncertainty" (Spanjer, 2007). "It is perceived to be a structural problem that may result in a delay or withholding of an investment decision" (Haase, 2009).

According to Glachant and Finon (2004), "two concurrent market theories influence the difference of opinions of economists on *unbundling*, which stands at the core of the liberalization of the natural gas market":

1. "The standard market theory considers that the number of players and competition at different levels of the natural gas value chain determine the players' conduct and the efficiency of the markets (Armstrong et al., 1994; Newbery 2001a). This suggests that commercial activities must be horizontally disintegrated among significant market players. Organisation of the interface between different parts of the value chain limits the exercise of market power by incumbents. This suggests a clear separation of commercial activities from the transmission system operation. Secondly, vertical integration between import/wholesale supply and retail supply under a hierarchical structure must be limited in order to limit entry barriers."

2. "A model of virtual competition proposed by the theory of contestable markets (Baumol et al., 1982) considers that, rather than structural conditions, the technical and jurisdictional conditions allow a credible competitive threat and virtual competition. The main objective of competition could be better reached by suppressing legal and technical barriers to entry. A credible threat of entry exerted by foreign competitors that are incumbents in their adjacent national markets would lead to effective allocation. In other words, industrial structures – horizontal concentration and vertical integration of import/wholesale supply and retail supply – might be preserved if non-discriminatory access to grids is guaranteed to the incumbents´ potential competitors with a complete unbundling of the networks."

Willner (2003) and later Bjoerkroth et al. (2006) came to the conclusion that "liberalization would have no need to bring more contribution than a welfare-maximizing public monopoly, if the gas industry remained imperfectly competitive.

Liberalization could come about either by market consolidation or deepening horizontal integration, which ultimately could bring higher prices and a transfer of strategic decision-making into the hands of a limited number of large companies. The intended opening of the market to new suppliers would become more difficult, and further regulation would be needed." Newbery (2001b) pointed to "proactive antitrust policies with the goal of resisting the power of vertically and horizontally integrated firms."

# 2. THE EUROPEAN UNION VISION

## 2.1. Concept

In order to increase the welfare of natural gas consumers, and in accordance with the talks about the efficiency of energy firms and the awaited rise of the European dependence on imports, European Union (EU) took the decision to allow the competition in national natural gas markets and to sum them into a unique liberalized European market for natural gas by taking advantage of the combined pan-European network and the cooperation of the network operators.

The EU states that unbundling is the main tool of vertically integrated market liberalization. At first, accounting unbundling took place, then functional and legal unbundling. In the past years, ownership unbundling was set as a suggestion by the European Commission. Legal unbundling leads to the segregation of the transmission system operator (TSO) and distribution system operator (DSO) as long as services with characteristics of a natural monopoly (transmission and distribution through gas networks) from the rest of the vertically integrated gas undertakings (VIU), above all from gas extraction and areas that may be affected by competition (import, wholesale and retail supplies). Unbundling's main target was to refrain from expressing favour towards the vertically integrated supplier/trader and to make sure the equal non-discriminatory access of third parties (TPA) to the existing gas infrastructure.

Areas of the "commercial activities" such as gas import and supply were decided to be liberalized. From liberalization, EU expects that new shippers/traders/suppliers (including international players) will enter the wholesale/retail market, and consumers will eventually choose the one that suits them more. Competition between shippers/traders/suppliers should bring modernization, lower prices and step up the quality and diversity of the products and services being offered, including types and lengths of contracts between market players. "Market liberalization and integration should increase the security of supply through the diversification of sources and transport routes. Natural gas prices should be de-coupled from oil prices and should be determined by matching demand and supply on newly established stock exchanges and secondary markets."

The section of naturally monopolistic network activities was scheduled to be regulated and brought to harmony. The EU took the initiative to form independent

national and supranational regulatory bodies, which will play the role of seting the rules of equal access and transparent price-setting taking into account transmission/distribution, and which will finally direct the inspection of the same by the gas network operators. "The EU anticipates that unbundled operators will secure fair access for competing shippers/traders/suppliers to the infrastructure, and that they will compete in attracting them (pipe-to-pipe competition of different transport routes should arise additionally to gas-to-gas competition in the commercial area). Network operators should aim to maximize the usage of network capacity, which should lead to the removal of bottlenecks; they should be motivated to invest in new interconnections, which will contribute to pan-European network integration."

in order to implement the above mentioned EU vision, Slabá (2008) uses the so-called "Structure-Conduct-Performance" model (SCP), defined by Scherer (1980). Scherer took the hypothesis that "the basic conditions influence the market Structure. Basic conditions and market structure influence the conduct of market players, thus further determining the sector Performance. The consequences also run in reverse (e.g. performance influences the market structure, etc)" (Figure 2.1).

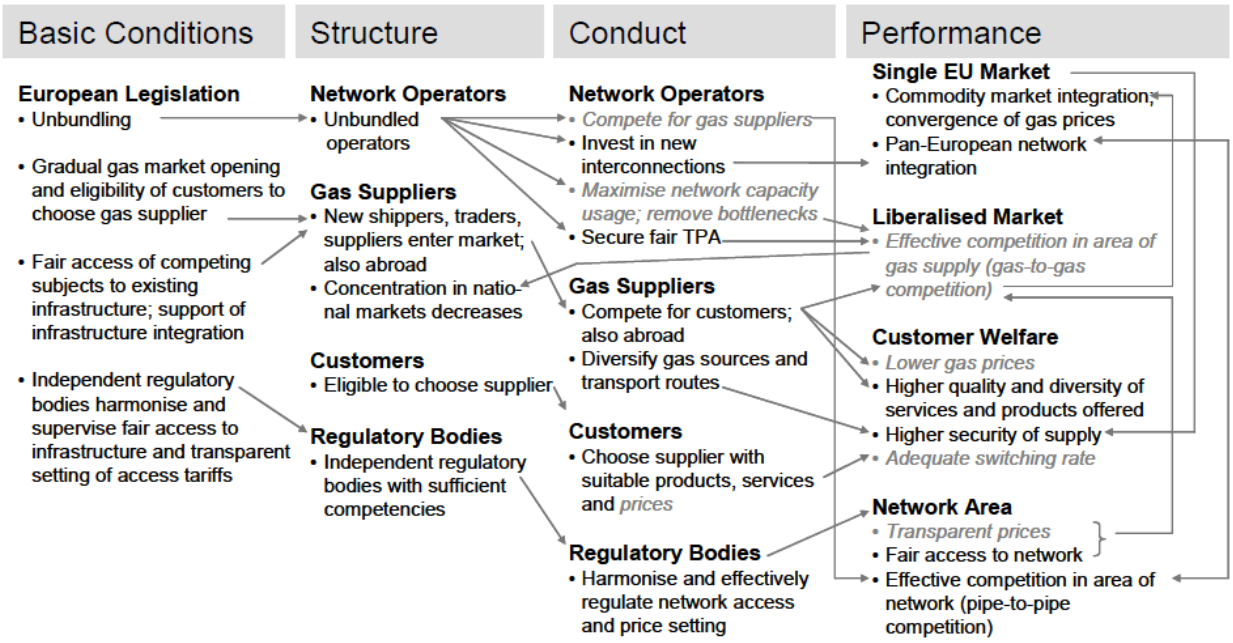



**Figure 2.1.** "Single liberalized EU Market for natural gas (EU vision – SCP Scheme)" (Slabá, 2008).

**1. Unbundling.** "The separation of the competitive segments of the industry can take place to varying degrees and may concern both vertical and horizontal unbundling of

the gas chain. The mildest version of unbundling concerns the simple separation of accounts (accounting unbundling) of the former integrated utility. The strongest version of unbundling is ownership unbundling, which involves de-merging the different activities of the gas chain into separately owned companies. Legal unbundling implies that activities that were once integrated into the same firm are separated and assigned to new corporations whose shareholders are, however, the same as those who once controlled the former vertically integrated utility. Functional unbundling aims to keep management units completely separate within the same company. Ownership unbundling is necessary to ensure that operation of essential facilities is truly non-discriminatory, as emphasized by the European Commission in the conclusions of its recent market investigation. For example, a former integrated utility can be considered, affected by legal separation between its gas transmission network – an essential facility operated by the Transmission System Operator (TSO) – and gas purchase and resale activities which are potentially competitive. The principle of Third Party Access (TPA), implemented by an independent regulator, should ensure that no firm will be discriminated against while demanding access to the transmission network. However, investment decisions concerning network expansion still depend on the owner. They may be affected by potential strategic behaviour of the incumbent gas utility, restricting competition by preventing expansion of the transmission capacity needed by new entrants. Such a strategy may increase total profits of the incumbent due to its dominant position in the wholesale market, although the profits of its transmission subsidiary may be negatively affected. Regulation may deem these strategies to be abuses of dominant positions, but this is a weak solution compared to ownership unbundling requirements implemented by ex-ante regulation (Cavaliere, 2007).”

**2. Third Party Access.** By the term TPA we refer to non-discriminatory access and price-seting rules for the transmission network, the distribution network, the LNG plants and storage facilities. Specifically about networks, the first European directive allows countries to elect between regulated and negotiated TPA.

“Since in most EU countries the separation of the network from the competitive activities has been only partial (legal or accounting unbundling), the incumbent still retains the possibility of setting high network charges to competitors, reducing their ability to compete in the liberalized segments. Ensuring a non-

discriminatory access to the network through a transparent and cost reflective tariff structure is therefore a crucial step in the implementation of the TPA principle" (Polo and Scarpa, 2003).

**3. Customer switching.** Common knowledge often mixes market liberalization with market opening on the demand point of view, i.e. how many consumers are free to choose their supplier (Eligible Customers).

## 2.2. Steps towards the implementation of liberalization

### 2.2.1. Goals

On January 1, 2009, the fears of many European policymakers were confirmed. After a payment dispute could not be resolved, Russia shut off natural gas supplies to Ukraine, leading to widespread gas disruptions across Europe. While this episode highlighted Europe's vulnerability in the energy sector, concerns over the security of supply for natural gas had been existed well before 2009.

Ever since the discovery of gas in the 1950s, it has played an overwhelming significant role in EU's energy consumption. Due to certain irregular technological and economic features of natural gas as an energy resource, the market has always been uncompetitive and characterized by a limited number of suppliers, leading to security of supply concerns. In an attempt to change this, the European Commission began an effort to enact liberalization reforms in 1998 with one of three Directives.

These Directives were designed to make the market more competitive and facilitate the entry of new suppliers into the market. The expected results of this are two-fold: lower prices for consumers, as well as increased energy security due to more options in suppliers. A quantitative analysis of EU documents shows that policymakers overwhelming believed that liberalization would increase energy security. However, after an examination of the three liberalization Directives using a mix of economic and qualitative data, there is little evidence that the legislation had positive effects on increasing competition and therefore energy security. Prices have increased, market concentration remains high, and customers are not switching suppliers.

Some of the examples include the Nabucco pipeline, and the Nord and South Stream pipelines. It appears that in the projects of Nabucco pipeline, Nord and South Stream pipelines, none of them included any of the main aspects of liberalization.

Natural gas was first used after World War II, and its share in Europe's energy consumption has been increasing ever since. The first discovery of natural gas occurred in the 1950s in the Po Valley in Italy, and in 1959, the Gronigen field was found in the Netherlands, and it continues to be Europe's largest deposit of natural gas today. According to the International Energy Agency, natural gas comprised 3% of Europe's energy consumption in 1965. That percentage rose to 20% in 2009, and the International Energy Agency predicts that by 2035, approximately 44 percent of Europe's energy consumption will be natural gas. Thus, it is clear that natural gas will be part of an increasingly major part in achieving energy security in Europe.

A large part of the concern about securing the supply of natural gas is that production occurs outside the borders of the EU. Russia holds 42 percent of the world's gas reserves, followed by Norway (24%), Algeria (18%), Iran (15%), and Nigeria (3%) and Libya (2%). The EU imports about 47 percent of all gas it consumes each year, and this percentage is foressen to increase.

In addition to the location of natural gas deposits, there are certain irregular technological and economic features of gas as an energy resource. Combined, these two elements create an inflexible and uncompetitive market that leads to security of supply concerns.

To discuss the gas market, it is necessary to divide it between the physical structure and the structuring of competition and the first influences the second. The physical structure of the natural gas market has three distinct sections: production, transmission and distribution. The production stage refers to when the gas is extracted from the ground and refined into a usable product. It is obvious, but necessary, to mention that producers are constrained by the fact that gas is a natural resource; firms simply cannot choose to produce natural gas. In the second stage, gas is transferred, primarily via pipeline, to the customer, and it is then locally distributed in the end-user country as the third step in the process. The vast majority of natural gas – approximately 80 percent – travels through pipelines that are extremely costly to build. For example, according to current steel prices, an average 400-km pipeline

would cost between $480 million to $770 million. Thus, natural gas differs from other energy sources such as oil, which can be bought, sold, and physically transferred with minimal difficulty.

The production and distribution stages are both dependent on the expensive transmission network of pipelines. The physical structure influences the lack of competition in the natural gas market, namely that the market primarily uses long term contracts, is oligopolistic, and characterized by both vertical and horizontal integration.

One of the features that has been consistently present in the natural gas market is long-term contracts. These contracts typically lock the buyer and seller into an agreement for a duration of around 25 years. The reason behind designing contracts this way is a result of the physical structure of the market. Due to the enormous start-up infrastructure costs, companies building gas pipelines need to ensure that there will be guaranteed demand after the project is completed so that they are able to recoup their initial capital investments. These long-term contracts "tie suppliers and users together in a contractual relationship which is substantially insulated from outside competitive pressures." The contracts are just one aspect of the limited competition in the gas market.

Another barrier to a competitive market is that the supply side of the gas market is oligopolistic (see Glossary for definition). In the case of Europe, four companies – Gazprom (Russia), Sonatrach (Algeria) and GFU (Norway) and Gasunie (Netherlands) – are responsible for supplying 87.7 percent of natural gas imports (Figure 2.1). Again, it is the physical structure of the market that affects how competitive it is. Since companies cannot simply choose to produce natural gas, once a company establishes itself in a region where there are gas deposits, it enjoys a natural monopoly on that particular field. Clearly, the supply of gas existing in the hands of a few companies is not conducive towards competition (Yu, 2011).

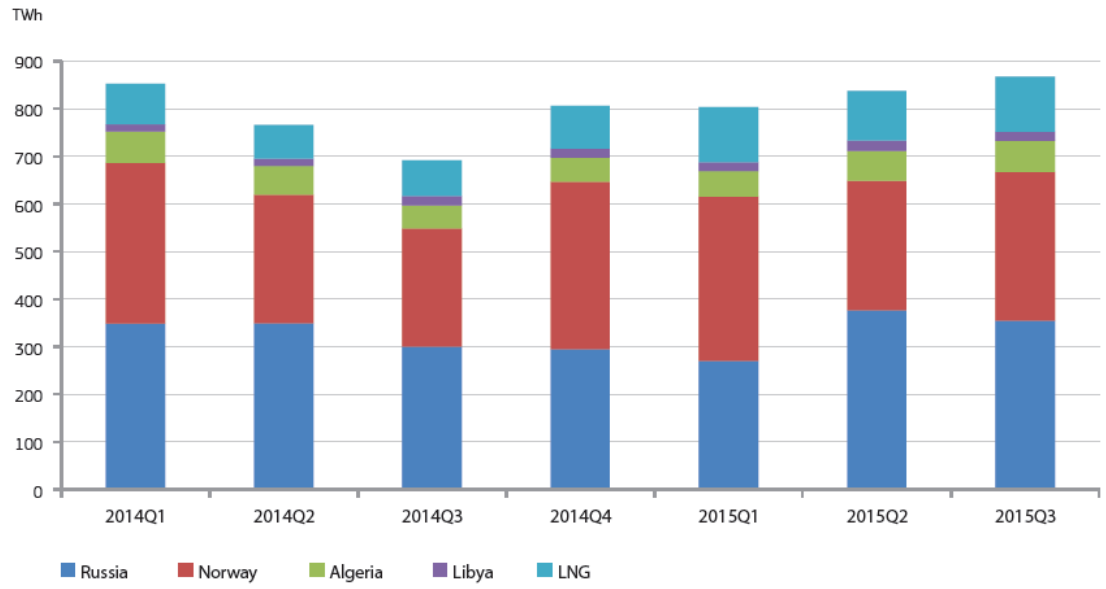



**Figure 2.1.** EU natural gas imports by source, 2014-15 (Eurostat, 2015).

The other relationship between physical structure and competition is how the transmission stage affects vertical and horizontal integration. In the case of natural gas, there is widespread vertical integration between the production stage and transmission stage.

A company is not going to extract natural gas without being assured of the existence of a transmission network to transfer their product to the end consumer. Likewise, companies are not going to enter the transmission stage and invest billions in pipeline infrastructure if there is no guarantee there will be natural gas to transport. Thus, there is an incentive for firms to integrate vertically to assure the success of both stages. Much of the rationale for Standard and Poor upgrading Gazprom's credit rating from negative to stable in 2010 is due to the presence of vertical integration. However, while it may be beneficial to Gazprom, it does not promote competition and the lower prices and increased energy security that follow.

Furthermore, the structure realities of the gas market also favor horizontal integration. As input and infrastructure costs for building the transmission networks are extremely high, they are "both difficult and uneconomical to duplicate." If there are two firms operating two different transmission routes, and one of the companies wants to start transporting gas over the other firm's route, a merger is a more likely option than laying down identical pipeline. The physical structure of the gas market, specifically the need to link the production and transmission stages, influences the

integration of firms, both vertically and horizontally. This lack of competition, as seen in long-term take or pay contracts, oligopolistic nature of the market, and the tendency for firms to integrate, explains a great deal of Europe's desire to enact liberalization reforms. Making the problem of an uncompetitive market severe is that of the few number of gas suppliers, most of the supplying firms are owned by politically unstable and unfriendly states (Yu, 2011).

From its inception, the European Union has lacked the strength necessary to ensure the effective implementation of its policy goals and regulatory efforts. The nature of the European Union, a federation of independent nations governed by a central authority, inherently creates the breeding grounds for an environment rife with divergent ideologies regarding energy policy, for example:

"In the past the natural gas industry in the European countries was typically characterized by vertically integrated state-owned companies and public monopolies operating both on the upstream and the downstream markets (Ivanova, 2012). The process of liberalising the EU gas market, which can be traced back to the 1980s, has been extremely slow, mostly due to the fact that neither the founding EEC Treaty (1957) nor the Maastricht Treaty (1992) provided the Community with the competence to develop energy policy. Hence any legislative action, which could be interpreted as an attempt to develop such a policy, ran the risk of being perceived by the EU Member States as lacking legitimacy. This explains the Community's decades-long quest for a formal treaty-based competence in the energy sector." Each country maintained its own distinct approach to meeting its energy needs and was reticent to place its power in the hands of an overarching European energy regulatory agency.

Moreover, power within the EU was concentrated in the hands of a few energy firms that wielded a significant amount of power and could simply ignore action taken by the EU. Throughout the 1980s and 1990s, the EU consisted of independent national gas and electricity markets dominated by state-run energy firms. Each country maintained its own internal market that was controlled by a state-run energy company. These firms managed and operated most, if not all, levels of the production and distribution chain.

For example, network operators perform the same time as suppliers. Vertical integration of gas companies defined the structure of European energy markets. These powerful energy firms not only discovered, produced, and compressed the gas, but they also ran its transmission and storage. Additionally, they distributed the final product to wholesale and retail suppliers, thus controlling every aspect of energy production, from the extraction of petroleum out of the ground to its conversion and eventual receipt by electricity companies. Sometimes these energy conglomerates even ran the companies that converted these resources and also the electricity companies that provided electricity to consumers. Because they administered every aspect of the distribution of electricity and natural gas to consumers, these firms had monopolies in the market and could dictate prices at their sole discretion. This also resulted in some instances of inefficiency within the utility structure, as no competing forces existed to motivate these state energy firms to improve their processes (Duncan, 2015).

In what has been deemed the "pre-liberalization phase" from 1990–1996, the EU came to recognize the exigency of removing power from the hands of these energy firms and opening the market to additional participants. During this time, a debate evolved between theoretical and practical economists in order to step up the amount of how effective the utilities are. Suggestions for privatization and liberalization were made. Nevertheless, European government officials understood that it was not simply enough to voice their pursuit of a policy of economic liberalization.

Rather, the actual substantive structure of corporate ownership of energy conglomerates needed to change, which would only occur with the introduction of a novel legal and market structure to govern these companies and help them move away from the current system of vertical integration. European energy officials made it their vision to stop the monopoly in the commercial activities of supply and import, to break the limits in the gas trade between national markets, and to strengthen the free access of the third parties to gas networks. As a result, in an attempt to break the monopolistic influence of the energy firms, European energy officials turned to the regulatory bodies and rules of the EU and began to change their framework. It would not be until the late 1990s, however, until the EU would start implementing changes within the EU's internal market (Duncan, 2015).

The first action taken by the EU in this informal pursuit of market liberalization was the creation of the Energy Charter Treaty (the Treaty). The goal of the Treaty, which was signed and ratified in 1994 by fifty-one signatories located both within and outside the EU, was to create a legal framework dedicated to the promotion of lasting international collaboration in the energy sector. The act was an attempt to open the European market to third-party players. For example, contracting parties were required to encourage and create stable, favorable and transparent conditions for foreign investors and apply the most-favored nation principle or offer the exact treatment that is granted to domestic investors, no matter which deal is favoured the most. Additionally, the Treaty laid out specific dispute resolution procedures for disagreements occurring between companies within the nation, and also cross-border disputes between an external company from a foreign country and the host state within the EU. The Treaty also set forth rules governing competition, transparency, and sovereignty within the host state. Specifically, countries were to enable competition between outside companies and internal, state-run monopolists by combating market distortions and barriers through legal provisions geared to address any unilateral or concerted anti-competitive behaviour in economic activities in the energy sector. Additionally, host countries within the EU were mandated to foster transparency by creating a central regulatory body to handle inquiries from foreign and third-party investors.

Finally, host countries subject to the contract were to maintain ownership of their resources and conduct operations in accordance with international law. Despite the positive operations set forth by the Treaty, it still lacked the force necessary to prompt any real change within the European internal market. It did not specify any punitive measures for host countries that failed to follow the Treaty's terms and appeared to be mainly prescriptive. There was no real impetus for countries to follow the Treaty. Furthermore, it pointed to international law as the source of host countries' sovereignty, further weakening the Treaty's appeal among its signatories. Nevertheless, this Treaty set the wheels in motion for the creation of three energy directives by the EU that would put the internal European energy market on the path to change (Duncan, 2015).

### 2.2.2. The First Energy Directive

Following the introduction of the Treaty, the EU then turned and truly focused on the liberalization of its internal market. It did so through the creation of three electricity and gas directives. The first set of liberalization directives (the First Directive) was adopted in 1996 (electricity) and 1998 (gas); these directives focused mainly on pointing out areas where competition could truly exist, and facilitated competition in those areas. The directives also identified areas that naturally supported monopolies and would require a different approach in the process of economic liberalization. A global approach was not taken to drastically implement implementation, but rather, the EU identified areas that would naturally be more receptive to the opening of the market and attempted to target those first.

The EU knew that many of the energy conglomerates would resist the entrance of third-party participants in the energy market and use their dominant positions to exclude them. As a result, the Community legislator instituted the Third Party Access system, in order to ensure that vertically integrated operators would not disfavor new entrants or construct other entry obstacles. One of the predominant features of the First Directive, however, was its identification of the risk posed by monopolies and its institution of separation policies to unbundle vertical conglomerates.

Transmissions companies could now choose from whom they received their energy and were no longer beholden to the state conglomerates. An additional feature of the First Directive that sets it apart is that the only unbundling that it authorized was accounting and management unbundling for electricity and accounting unbundling for gas. It forced the state conglomerates to abolish their vertical integration only in these areas. However, although insufficient to trigger any real change, the First Directive proved to be a step in the right direction.

Although the First Directive brought many benefits and was the first real step towards bringing regulatory change to the European internal market, it soon became clear that the requirements were inadequate. The Commission of the European Union launched a series of studies demonstrating that Member States were still discriminating against third-party market players and catering to the state-run conglomerates.38 The First Directive simply had not been forceful enough or suggested enough change to precipitate any real change in the market (Duncan, 2015).

### 2.2.3. The Second Energy Directive

As a result, the EU proposed and set in motion a Second Directive package (the Second Directive). The main goals of this second package were to strengthen the unbundling requirements on network operators, to strengthen the rights of access to the networks, to remove the remaining exclusive supply rights and to establish independent sectoral regulators. Whereas the First Directive had focused on transmissions operators not discriminating amongst the available suppliers rather than general structural change in the market, the Second Directive instead wanted to level the playing field for third-party suppliers and companies.

With the First Directive, the emphasis was placed on the behavior of the transmissions companies. After the implementation of the First Directive, however, the European Union recognized that transmissions companies and operators would be recalcitrant to change.

The Commission realized that it needed to erase any distinction between gas flows coming from both within the host state and abroad. Specifically, the Commission wiped out the notion of transit and guaranteed the same treatment to all gas flows inside the EU, regardless of being cross-border(s), by ensuring regulated third-party access to all transmission networks on the basis of tariffs (or methodologies) approved by national regulatory authorities. The 2003/55/EC Gas Directive that was part of the second package gave third parties a legal right to non-discriminatory access to transmission and distribution systems and to LNG facilities. Conversely, the Commission ordered that system operators were not allowed to provide preferential treatment to one company over another and they had to make sure non-discriminatory and transparent access to the system for all users. The EU was tackling the problem from both sides of the production chain.

Furthermore, whereas with the First Directive the EU had ordered that only the companies' accounting functions needed to be unbundled, with the Second Directive the EU ordered that the transmission, distribution, production, and supply activities had to be completely separated and unbundled. It also instituted an additional layer of change through its imposition of consumer protection regulations. Rules were created that guaranteed consumers items such as the right to change

supplier, transparent contract conditions and dispute settlement mechanisms. No longer were consumers to be at the mercy of their suppliers. They were to be guaranteed a secure supply delivered on a timely, reasonable basis. The Second Directive also established a baseline for the quality and price that consumers would receive. Finally, the Commission set a firm timetable within which it sought to guarantee the arrival of the market to full competition.

The most important part of the Second Directive package, however, lay in its designation of transmission and distribution system operators and regulatory authorities within each Member State. Each entity was given specific tasks that they were to be responsible for in order to facilitate the move towards internal market liberalization. For instance, transmission system operators were to be responsible for guaranteeing long-term capacity for meeting the electrical needs of each Member State. They were also placed in charge of monitoring other interconnected systems and gauging the needs of their particular Member State based on their observations. Transmission system operators also were responsible for policing potential instances of discrimination and serving as an information source for system users. Distribution operators, on the other hand, were tasked more with the efficient allocation of resources. Like transmission system operators, they were responsible for policing discrimination and ensuring reliability and security within the distribution system. However, they were separately tasked with procuring the energy they use to cover energy losses and reserve capacity in their system according to transparent, non-discriminatory and market-based procedures. Distribution officers needed to ensure that their respective systems were being run in the most efficient way possible. This act also created a position for independent regulators within each Member State that were responsible for "monitoring respect of the non-discrimination principle, the level of transparency and competition, and the tariffs and methods for calculating them (Duncan, 2015).

Clearly, the energy initiatives being taken by the EU were having little impact on the internal market. So, in yet another attempt to try to facilitate market liberalization, the Commission passed a third set of energy directives (the Third Directive). It adopted a fundamentally new approach aiming at changing the structure of the EU gas market and developed a third generation of new IEM legislative proposals, which would be capable of rectifying the problems identified by the

Inquiry. The EU's hope with the passage of the third set of directives was that a majority of the states would finally begin to actually implement and enforce the regulations that the EU had been advancing for nearly a decade (Duncan, 2015).

### 2.3.3. The Third Energy Directive

Nevertheless, as with the previous two energy directives, some of the requirements seen in the Third Directive appeared nearly the same as the previous two. For example, the Commission re-emphasized that Member States needed to focus on unbundling, ensuring non-discrimination among suppliers, and guaranteeing equal access for customers. They were to do everything laid out in the Third Directive in order to "guarantee fair competition and appropriate consumer protection. In fact, some of the language from the Third Directive essentially mirrored that of the Second Directive. For instance, it ordered the pursuit of information unbundling, which had been referenced in the earlier directive. The Commission sought to ensure that information remained separate between the suppliers and network affiliates in order to bolster competition. Furthermore, the Commission tasked transmission system operators, distribution network operators, and regulatory authorities with the same responsibilities it had given them before. Transmission operators were responsible for monitoring the long-term energy needs of their respective states and ensuring the provision of adequate supplies, in addition to enforcing non-discrimination mechanisms and providing information to network users. Distribution network operators were tasked with ensuring the efficient distribution of resources at a regional level.

National regulatory authorities, similarly, were to oversee the activities of both operators and ensure compliance with all aspects of the Third Directive. The Third Directive, however, differed from both the First and Second Directives through its requirement of greater accountability within the supply and distribution chain and among the operators and regulators. Unlike before, transmission system operators had to undergo an official certification process prior to being granted status as an official transmission system operator. Furthermore, transmission system operators were now responsible for submitting an annual report to the Commission describing the condition of their state's system, in addition to outlining the parts of the infrastructure

that required either creation or renovation. Rather than operating in a vacuum, transmission system operators were now to report to the EU on the status of their enforcement of the Third Directive, in addition to mapping out the needs of their particular state. This new level of accountability was further bolstered by the guarantee of access rights of regulatory authorities to natural gas accounts. In the interests of enforcing unbundling provisions, energy companies were required to keep their various accounts and activities separate. Now, regulatory authorities had the ability to go in and make sure that these barriers were actually being enforced.

Perhaps the most distinctive feature of the Third Directive was its outward focus on generating third-party competitors and its emphasis on cross-border issues. More than ever before, in accordance with its recently issued Priority Interconnection Plan, the Commission focused its efforts on generating activity across state borders and even pressuring non-EU countries to abide by the norms set forth in the Energy Directives. In this final, Third Directive, the Commission went so far as to present the methodology of how to push non-EU countries or companies to behave in respect to EU internal rules even when their own domestic market is concerned.

"The EU understood that most of the Member States' resources come from countries, predominantly Russia, that do not value market competition and directly hinder the EU's efforts to bring more third-party competitors to the market. In order to stimulate third-party access, the Commission in this Directive ordered authorities in Member States to take measures to ensure that eligible customers can obtain access to upstream pipeline networks and organise a system of third party access to transmission and distribution systems" (Duncan, 2015).

Specifically, the Commission changed from a point-to-point (PP) system for shippers to an entry-exit (EE) regime. With the PP system, every transaction occurs before natural gas inserts the transmission system, whereas with the EE system, transaction occurs after natural gas has inserted the transmission system, thus allowing for a greater number of independent traders to participate in the market based on the needs of downstream transmission companies. The Third Directive also brought the implementation of twelve pan-European Network Codes governing cross-border transaction: "capacity allocation and excess management rules; balancing rules; rules concerning harmonised transmission tariff structures; interoperability

rules; network security and reliability rules; network connection rules; third-party access rules; data exchange and settlement rules; operational procedures in an emergency; rules for trading; transparency rules; and energy efficiency regarding gas networks." Distinctive regulations now existed to govern the most significant issues encountered in cross-border transactions between suppliers, traders, transmissions companies, and distributors. Regulatory authorities could now access concrete bodies of law to solve cross-border issues rather than merely succumbing to the forces of energy conglomerates.

In fact, only four states had followed the necessary legislative steps to ratify the Directive, and they had not even carried out the steps fully. As of 2015, a great deal of vertical integration still exists, as countries have failed to implement unbundling regulations or have just been slow to do so. This failure to ratify and implement unbundling regulations is not because these countries or companies lack the necessary resources to enact this legislation, but instead, it is simply a result of their blatant refusal to comply. For instance, "even where Member States have adopted the unbundling provisions this does not necessarily mean that network operators comply with them as the Sector Inquiry has demonstrated that incentives for preferential treatment within vertically integrated operators remain. Despite the efforts of the Commission to change the structure of the market, a number of factors must be addressed at the regional, national, and international levels in order for any real change to be accomplished" (Duncan, 2015).

# 3. THE ROAD SO FAR

## 3.1. Greek Natural Gas Market and Transmission System (NNGS)

Natural gas production of Greece is slim. The South Kavala natural gas field, located in the Kavala Gulf of the Aegean Sea, produced 5 mcm in 2012. Natural gas demand has risen steadily from the early 1980's and stabilized at 4.4 bcm (12 mcm/d) in 2012. In 2011, transformation represents about 61% of total consumption, succeeded by industry (24%) and residential use (9%).

The Greek National Natural Gas System (NNGS) consists of the main high pressure natural gas transmission pipeline from the Greek-Bulgarian borders to Attica (Elefsina location Patima), the high-pressure divisions linking various areas of the country with the main pipeline, such as the branch connecting the main pipeline with the Greek-Turkish borders, the Liquefied Natural Gas (LNG) facility at Revythoussa island, as well as other facilities and infrastructure that service the entire Gas Transmission System.

"Natural Gas is injected to the NNGS through three Entry Points, Sidirokastro, located at the Greek-Bulgarian borders, Kipi Evros, located at the Greek-Turkish borders, and Agia Triada, on the coast opposite to Revythoussa island" (Sifnaios, 2014). "In 2013 more than 66% of the gas imported into the country came from Russia and 18% was imported from Turkey. The remaining 16% was imported as LNG at the island of Revithoussa and was injected into the transmission system from the Agia Triada entry point" (RAE, 2014).


**Figure 3.1.** Gas infrastructure of Greece (Sifnaios, 2014).

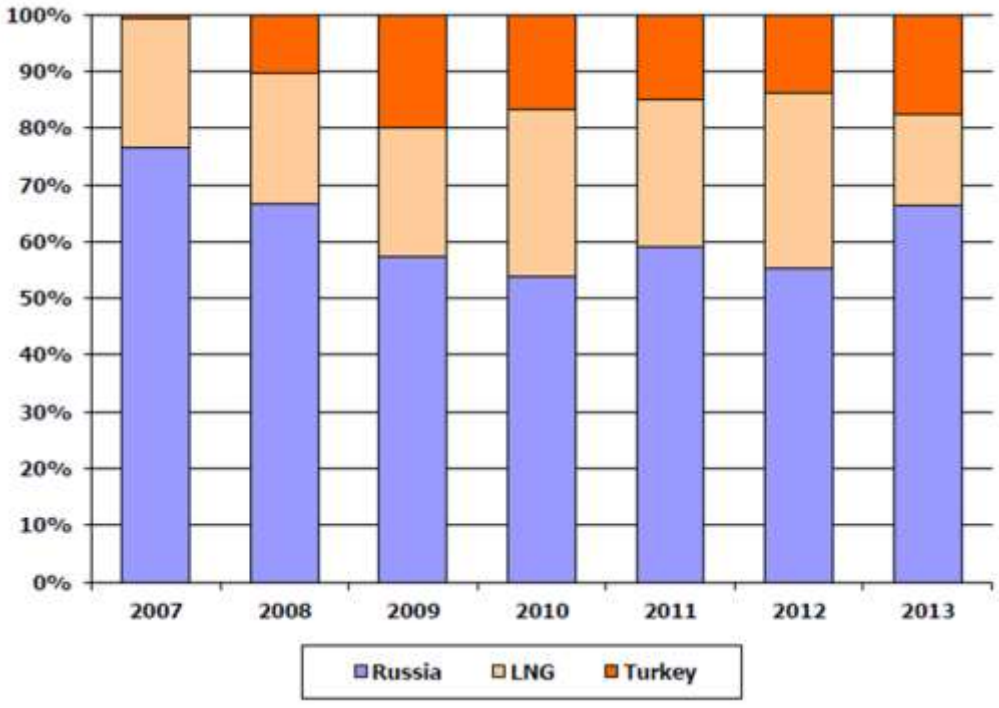



**Figure 3.2.** Share of natural gas import sources, 2007-2013 (RAE, 2014).

"Key elements of Greece's overall policy on natural gas security are diversification of supply sources, establishment of market-based demand measures, reduction of the LNG delivery lead times during periods of high demand, signing of new contracts for gas supply as well as development of the natural gas transmission system (updating the existing LNG terminal, a new pipeline and an underground gas storage facility). The transmission system operator (TSO), DESFA, plays a major role in emergency planning and managing crisis situations. Interruption of gas supply for customers based on a priority list, fuel switching at power stations and the use of gas reserves stored at the LNG terminal are foreseen as emergency response measures in a gas crisis. In order for new gas-fired power producers to be granted with a production license, they are obliged to hold at least five days of backup reserves of alternative fuel. Five thermal power generation units, which use gas as primary fuel, can switch to an alternative fuel."(IEA)

"Besides DEPA S.A., which supplies gas at the wholesale and the retail level, and the self-importing/self-consuming eligible customers mentioned above, there are three distribution companies (known as EPAs), which supply gas to non-eligible customers, each being a monopoly in a specific geographical area: EPA Attica, EPA Thessaloniki and EPA Thessalia. DEPA S.A. owns 51% of each EPA, thus, by the domination principle, DEPA holds at the retail level the same share as in the wholesale market.

In October 2011, the EPA Attica changed its methodology for setting customer tariffs, the previous one linking natural gas prices to the price of oil. From 1 October 2011, the EPA Attica pricing methodology is cost-based and is similar to those of EPA Thessaloniki and EPA Thessalia. Natural gas prices for residential, professional and commercial consumers result from the summing up of: a) the cost of gas supply, b) the distribution margins and c) taxes.

During the 2010-2012 period, when there was considerable competition in imports of natural gas in Greece, the share of DEPA gas imports corresponded to about ninety percent (90%) of total annual imports. However, in 2013, the share of DEPA gas imports reached ninety-nine percent (99%) of total annual imports. Only two (2) other companies (one gas supplier and one big industrial consumer), beyond

DEPA, imported natural gas in the country in 2013, representing the remaining one percent (1%) of total imports.

By 2014 gas market was still organised on the basis of bilateral contracts between suppliers and eligible customers; no organised wholesale market exists yet. Transactions that have been recorded so far involve a) wholesale trading of LNG quantities in-tank, b) resale of gas between eligible customers, and c) DEPA's electronic natural gas supply auctions" (RAE, 2014).

"The companies that have been granted a Gas Supply Authorisation until 2015 are presented in Table 3.1.

**Table 3.1.** Gas supply authorisations registry (RAE, 2014).

| No. | Company |
|---|---|
| 1 | DEPA S.A. |
| 2 | PROMETHEUS GAS S.A. |
| 3 | EGL HELLAS S.A. |
| 4 | M AND M GAS CO |
| 5 | HELLAS POWER S.A. |
| 6 | EDISON HELLAS S.A. |
| 7 | ENIMEX S.A. |
| 8 | TERNA S.A. |
| 9 | HERON THERMOELECTRIC S.A. |
| 10 | GUNVOR INTERNATIONAL B.V. |

Furthermore, according to the Gas Law, any person wishing to become a shipper has to be registered in the National Natural Gas System Registry, in order to conclude a (transmission or LNG) contract with the TSO. In 2013, twenty six companies were officially registered as potential users of the NNGS, five of which were active in 2013" (Table 3.2).

**Table 3.2.** "Companies officially registered as NNGS users (RAE, 2014).

| No. | User's Name | Classification |
|---|---|---|
| 1 | ALUMINIUM S.A. | Eligible Customer |
| 2 | MOTOR OIL (HELLAS) S.A. | Eligible Customer |
| 3 | PUBLIC POWER CORPORATION S.A. (DEI) | Eligible Customer |
| 4 | EDISON S.p.A. | Third Party |
| 5 | PUBLIC GAS CORPORATION S.A. (DEPA) | Natural Gas Supplier |
| 6 | ELPEDISON POWER S.A. | Eligible Customer |
| 7 | ELFE S.A. | Eligible Customer |
| 8 | PROMETHEUS GAS S.A. | Third Party |
| 9 | HERON THERMOELECTRIC S.A. | Eligible Customer |
| 10 | HERON THERMOELECTRIC STATION OF VIOTIA S.A. | Eligible Customer |
| 11 | PROTERGIA S.A. | Eligible Customer |
| 12 | M AND M GAS CO | Natural Gas Supplier |
| 13 | KORINTHOS POWER S.A. | Eligible Customer |
| 14 | E.ON RUHRGAS AG | Third Party |
| 15 | STATOIL ASA | Third Party |
| 16 | EDISON HELLAS S.A. | Natural Gas Supplier |
| 17 | TRANS ADRIATIC PIPELINE A.G. | Third Party |
| 18 | GASTRADE S.A. | Third Party |
| 19 | LARCO S.A. | Third Party |
| 20 | ELPE S.A. | Third Party |
| 21 | TERNA S.A. | Natural Gas Supplier |
| 22 | ELVAL S.A. | Eligible Customer |
| 23 | SOVEL S.A. | Eligible Customer |
| 24 | SIDENOR STEEL INDUSTRY S.A. | Eligible Customer |
| 25 | FULGOR GREEK ELECTRIC CABLES S.A. | Eligible Customer |
| 26 | HELLENIC HALYVOURGIA S.A. | Eligible Customer" |

### 3.2. Legislation

The "legislative and regulatory framework of the Greek natural gas sector has been significantly modified over recent years, through the transposition of the EU gas market Directives into Greek law. However, it should be mentioned that Greece benefited from derogation of the implementation of the second EU Gas market Directive (2003/55 EC) due to the infant gas market. The Law 3175/2003 introduced the primary measures for the liberalization process since the market was opened for the gas-fired power producers and cogenerators with an annual consumption of more than 25 million cubic meters (mcm). This meant that over 60% of the market had been liberalised by 2009" (Fafaliou and Polemis, 2009).

"DESFA was established in March 2007 after the completion of the legal unbundling procedure of the Public Gas Corporation of Greece" (DEPA S.A.). DESFA owns and operates the Greek Transmission Network and Revithoussa LNG Terminal in accordance with the Third Energy Package. It has been recently certified as an Independent Transmission Operator.

DEPA's share capital extents to 991.2 million Euros. 35% is owned by the Hellenic Petroleum S.A. company and the rest 65% belongs to the Greek State. The Public Gas Corporation (DEPA) lies within the jurisdiction of the Ministry of Development.

TPA rules to the LNG terminal, along with the rules for accessing the Greek Natural Gas Transmission System, are set in the Network Code which was approved in April 2010. Third party access to the NGTS during the transitional period (until the approval of the System Code of Operations), followed the terms and provisions of Ministerial Decision No. 1227 (Official Gazette B΄ 135/05.02.2007), establishing the procedure for the conclusion and the contents of the standard transmission contract for the access and use of the Transmission System.

TPA tariffs were determined by Ministerial Decision 4955/2006 following a proposal by RAE. The access conflicts which took place in late 2009 and early 2010 at Revithoussa LNG terminal, described below, triggered the final approval of the Network Code. In this regard, on 12th January 2010, DESFA issued a press release clarifying the situation on natural gas market deregulation.

The “most important provisions of the national legislation, from which arise the competences of the Regulatory Authority for Energy (RAE) and DESFA S.A. regarding the security of natural gas supply, are quoted below” (RAE, 2009):

“RAE is responsible for monitoring the country’s security of natural gas supply. In this framework, RAE:

1. Recommends the necessary measures and sets forth suggestions for the security of supply, taking under consideration data provided by the TSO, the customers and the natural gas companies.

2. Prepares yearly this report, which summarises the relevant conclusions and recommendations.

The TSO, as exclusively responsible for the operation, maintenance, development and utilization of the National Natural Gas System, among other things:

1. Ensures the prompt and efficient handling of emergencies. For this reason, they prepare an Emergency and Crisis Management Plan. This plan is approved by the Minister of Development, following RAE’s opinion.

2. Compiles an interruption of natural gas supply schedule for customers, in the event of an emergency, which is approved by the Minister of Development, following RAE’s opinion.

3. Enters into contracts with major customers for the interruption of natural gas supply by priority, in the event of an emergency. This contract is signed mandatorily with the electricity production licensees who maintain stocks of alternative fuel.

4. In the event of an emergency, interrupts by priority:

a. Unterruptible customers .

b. Other customers, according to the interruption schedule.

5. Issues orders to Suppliers who supply not only Major Customers, so that, in the event of an emergency, they shall supply continuously natural gas to customers that are not Major Customers. For the fulfillment of this obligation, the aforementioned Suppliers are fully compensated, as provided for in their licenses.

6. Collects a security of supply levy from the Users".

On 13th April 2010, DESFA announced the publication of the Network Code by RAE (i.e. Greek Law 3428/2005 as amended and in force, the Ministerial Decree No. Δ1/A/5346/2010 "Network Code" Government Gazette B' 379/01.04.2010 and the decision of the Regulatory Authority for Energy (RAE) No. 611/2010 for the approval of the Standard Transportation Agreement (STA) and Standard LNG Terminal Usage Agreement (SLTUA)).

Law 4001/2011 brought EU Directives involving rules for domestic markets in electricity and the obligatory further liberalization of domestic EU member states natural gas markets into national legislation. On this ground, and moving one step further, this legislation backed the reforms in the Greek energy sector, mostly consisting of partial privatization of state-controlled energy companies. Amongst its main provisions, the law stipulated the unbundling of the system operators and enhanced the role of the independent regulator regarding energy security, licensing, monitoring of the market and consumer protection. The previously mentioned law was afterwards amended in December 2011, by a Governmental Legislative Act, to grant for every model, Ownership Unbundling or ITO, to be pursued in the case of DEPA S.A. and DESFA S.A (Table 3.3). This amendment was submitted in order to fulfill the government's intention to privatize the incumbent and in the prospect of permitting potential investors to acquire one or both of the above companies. A second amendment of Law 4001/2011, which was performed by two consecutive Government Legislative Acts, occurred in November of 2012, "in order to introduce more specific provisions on the implementation of either the Ownership Unbundling or the ITO model, to accommodate the DEPA/DESFA S.A. privatization process. Consequently, the TSO's certification procedure started only at the end of December 2012, when DESFA S.A. submitted an application to RAE to be certified as an Independent Transmission Operator (ITO model)." (RAE)

In 2013 RAE adopted the following decisions on the preliminary TSO Certification of DESFA, under the ownership of DEPA:

1. Decision 184/2013 on the "Approval of DESFA's Compliance Program, in accordance with the provisions of Law 4001/2011".

2. Decision 199A/2013, on the "Approval of the Supervisory Board and of the Compliance Officer of the Company "Hellenic Gas Transmission System Operator (DESFA) SA" .

3. Decision No. 199B/2013, on the Certification of the Company "Hellenic Gas Transmission System Operator (DESFA) SA", as an Independent Natural Gas Transmission Operator, which was the preliminary certification decision, in accordance with Article 10 of Directive 2009/73/EC and Article 64 of Law 4001/2011.

**Table 3.3.** Incumbent natural gas market structure after wholesale unbundling (Bikos, 2014).

| Activity | Company | Shareholders | Business description |
|---|---|---|---|
| Trading | ΔΕΠΑ | • Hellenic Republic (65%)<br>• Hellenic Petroleum (35%) | • Incumbent natural gas wholesaler in Greece<br>• Imports natural gas from Russia, Algeria and Turkey<br>• Main customers include power producers, industrials, and regional gas supply companies |
| Gas transport | ΔΕΣΦΑ | • DEPA (100%) | • Owns and operates the national natural gas transport system and LNG terminal<br>• Regulated monopoly providing stable inflation-protected cash flows |
| Distribution | ΔΕΠΑ | • DEPA (51%)<br>• Attiki Gas (49%) | **EPAs**<br>• Operate regulated distribution networks and sell gas to residential, commercial and small industrial customers<br>• 30-year concession right to operate network<br>**Three new EPAs**<br>• To be established in Sterea Hellas, Eastern Macedonia and Thrace and Central Macedonia |
| | ΔΕΠΑ ΔΕΠΑ | • DEPA (51%)<br>• ENI S.p.A. (49%) | |
| | New EPAs | • DEPA (51-65%)<br>• Investors (35-49%) | |

# 4. THE THIRD GREEK BAILOUT PACKAGE

## 4.1. Introduction

On 14th August 2015 the Government passed a new law introducing radical changes in many aspects of the economy, most notably bringing tax, pensions and other substantial burdens on the Greek taxpayer in implementation of the Government's obligation towards its lenders to introduce new cost-cutting measures in exchange for a further loan. This law is commonly known as the "Third Memorandum" between Greece and its lenders, and it contains the most austere measures seen so far. In it, the Government also included a new law on the liberalization of the natural gas distribution sector in Greece. Such liberalization was one of the requirements imposed by the country's lenders as early as 2014 and its provisions had undergone a public consultation before the change of Government in January 2015. The law, as enacted, includes very few changes in the area of natural gas from the bill put forward to the public consultation last year.

According to Section 4, referring to growth, competitiveness and investment, it is mentioned that "Greece will design and implement a wide range of reforms in labour markets and product markets (including energy) that not only ensure full compliance with EU requirements, but which also aim at achieving European best practices" (Kolia, 2015).

Target of the European internal natural gas market completion is the creation of an open energy market which will provide every consumer the option to choose freely his natural gas supplier, every supplier to supply energy to his customer at his will and to the economy to use technologically new energy infrastructure in order to minimize energy cost at each country's production sector.

However there are still obstacles in European energy market development, mainly in the grid access, different levels of energy market completion, differences in consumer prices, in free supplier choice and so on.

In this framework, Greece tries to follow European union model with the third Target model in natural gas.

Specifically Greece aims at adapting to other state members in terms of the retail natural gas market. In order to achieve this goal, it is necessary to unbundle the

already functional distribution companies of natural gas (EPAs) which operate against the existing regulatory networks framework because of European Commission's deviations implemented during their installment. A similar unbundling occurred recently at the distribution of high pressure natural gas with the creation of DESFA. In order to achieve this goal the modification of law 4001/2011 is necessary.

The regulated natural gas model in all EU member states implements the unbundling of retail sector, by the operation of two companies, Operation and Distribution. Distribution functions with objective rules securing TPA in the network and a full market opening with a stepping abolishment of supply limitations.

Targets of the already proceeding unbundling are the achievement of competitive natural gas prices and the free selection of supplier. It is something similar to the successful competitive function of communications sector.

Extreme caution during the unbundling shall be given to the role of DEPA in the developing market as a crucial factor of ensuring the proper natural gas market function.

The liberalization of natural gas retail market shall be on its own a major step towards increasing competitiveness in retail and market. That's why the liberalization of natural gas retail market as soon as possible is the main target of the amendment of law 4001/2001.

The liberalization of natural gas retail market can begin at early 2016 and complete gradually until 2018. The unbundling of natural gas distribution and DESFA took a similar time period to complete. During the unbundling of today's era EPAs, companies transform to EDAs and companies of network transmission manager.

This unbundling is mainly logistic and because of that it will not be a burden to the state budget. Any claims that may occur from the exclusive right of natural gas supply that EPAs used-wrongly-to perform and the expiry of their usage licenses before the completion of the licenses' time limit shall be dealt in the framework of EPA unbundling negotiations.

### 4.2. The changes brought forward regarding distribution functions and ownership of distribution systems

The new law (4336/2015) provides for the abolishment of the existing exclusive rights of the EPAs to supply and operate their respective distribution systems. The EPAs will no longer have a distribution function and will spin-off and transfer their distribution function to new companies by January 2017; such companies will be functionally and legally different from the EPAs, but will be in the hands of the same shareholders as the EPAs. The new companies, called EDAs, will operate the relevant distribution systems with the first right to expand their network. They will be distribution system operators and will operate under a distribution license and a license to operate a distribution system of a 20-year duration. Such right is however subject to revocation and third-party operators may be allowed to build independent systems within the EDA distribution systems if the EDAs do not fulfill a customer's request for connection within 18 months from the scheduled time under their development programs. The provision is rather vague and does not clarify what happens if a connection is scheduled to be constructed at a point in time beyond the first 5-year development program and therefore not included in the development program.

The ownership of the distribution systems that EPAs have built will be vested to DEPA S.A. and the EDAs will operate such systems under license and without paying fees to DEPA for the use of the assets. The ownership of the new systems that the EDAs will build will be vested on the EDAs.

The EDAs will be functionally independent from the vertically integrated parent companies, pursuant to the provisions similar to the unbundling obligations set out in article 26 of the Third Natural Gas Directive (EU Dir. 2009/73) applicable for distribution companies.

DEPA is also vested with the right to set up a new EDA (as a spin-off of its distribution functions) which shall obtain a distribution license for areas covered under the vague description "the rest of Greece"; it can also set up more EDAs which will receive separate territories from the above description (Kolia, 2015).

### 4.3. The changes brought forward by the new law regarding supply to Eligible and Non- Eligible Customers

The supply to Non-Eligible customers is performed by the old EPAs pursuant to regulated tariffs approved by RAE. The EPAs may also supply Eligible Customers, but the tariffs should clearly not allow cross-subsidisation between Eligible and Non-Eligible customers. The supply of Eligible customers by the EPAs will not be regulated in terms of prices, but it will need to comply with the provisions of a supply licence and a supply code approved by RAE, as will be the case for all other suppliers too. RAE has the power to impose caps on allowed profits to suppliers in case those prices are set at levels not justified by the conditions in the local or international market and fair competition.

In any event, all customers within the EPA territories (household and non-household) shall become Eligible on 1 January 2018; note that industrial customers with an annual consumption over 2.2 GWh are already eligible, and non-industrial customers with such consumption will also become eligible by 1 January 2017. The relevant article in the new law is not well drafted and seems, probably by oversight, to exclude from the definition of Eligible Customers the customers that have already become Eligible prior to the enactment of the new law. Furthermore, the article of the new law is unclear as to what happens to non-eligible customers who are located outside the territories of the EPAs. The bill provided that all customers located outside the territories of the EPAs would be considered Eligible Customers from the entry into force of the law; such provision is missing from the law as enacted.

The EPAs in their position as supply companies shall compete freely with other suppliers for the supply of Eligible Customers; DEPA S.A. will remain a 51% shareholder of both the new EDAs and the EPAs, therefore competing with the latter over the supply of Eligible Customers.

It must be noted that until the spin-off, the EPAs (and thereafter the new EDAs) are themselves characterised as Non-Eligible Customers, having the obligation to purchase their gas needs from one of their shareholders, DEPA, at least up to a level of their contracted requirements in 2010 and insofar as such gas is used to

supply Non-Eligible Customers. This obligation will remain for as long the EPAs supply Non-Eligible Customers, i.e. probably until 1 January 2018.

There is a further provision that reduces the power of the EPAs to supply Non-Eligible Customers for the restricted period while they remain Non-Eligible; customers located within the territories of the current EPAs may apply to be connected to the distribution system within a period of 3 months. If EPA (or EDA as the case may be) cannot proceed to the connection within this time period, the customer may seek supply of natural gas from other providers, i.e. the customer will become an Eligible Customer. This provision clearly puts the EPAs in a difficult position, since they are in fact obliged to proceed to connections within 3 months otherwise they lose the customer from a supply view point; it is not clear however who will proceed to connection in terms of distribution works to the customer, as the EPAs in that case have a larger timeframe within which to construct such connection (Kolia, 2015).

### 4.4. The changes brought forward by the new law regarding tariffs and transitional law

Article 87 of act 4001/2011, as amended by act 4336/2015, states the tariff regulation of both eligible and non-eligible customers. Especially, RAE is the one authorized for the issue of regulated tariffs for the non-eligible customers in accordance to EPAs and DEPA proposal. In order to grant these regulated tariffs RAE has to follow certain rules, such as the principle of non-discrimination between non-eligible customers and the exclusion of cross-subsidies. The tariffs should also guarantee the return of the real supply cost plus a proper profit for the EPAs. In specific cases, and only for a limited period, RAE is authorized to set a maximum profit margin to suppliers.

The opening of the retail natural gas market furthermore requires transitional law which is included in the new legal framework. RAE will specifically construct the tariff regulation and the code for the distribution network operation in accordance with DEPA's and the already existing EPA's proposals, at their capacity as existing network operators. After this, RAE will grant the network tariffs in DEPA's and the

current bundled EPA's proposal. Before the grant of such regulations, act 4336/2015 arranges that network users shall pay to the network operator for access to the grid.

Last, after the legal and functional unbundling of EPAs and DEPA, the already existing distribution licenses they own will be replaced by new distribution and operation network licenses given to the EDAs. Natural gas supply licenses will be granted to EPAs accordingly. Until the new supply licenses are issued, act 4336/2015 states that bundled EPAs are free to supply eligible customers as well as customers living outside the geographical areas mentioned specifically in their existing licenses.

## 5. ARGUMENTS IN FAVOR

It is believed that the liberalization of the natural gas market has as main outcome the increasing competition on the market. Specific aspects of the natural gas industry inevitably drew the attention of the regulators, particularly the monopoly forms, such as the pipeline systems. Given the long financial cycles of the industry, it is particularly vulnerable to regulatory changes which can be a source of risk and, therefore, cost. Such uncertainty can undermine investment.

International Energy Agency (IEA) states claim that, when it comes to formulating energy policies "the establishment of free and open markets is a fundamental point of departure. In order to reconcile a consistent energy policy with a commitment to markets, regulation must evolve to ensure that markets deliver long-term energy strategies. A good example of adaptive energy regulation can be seen in the United States gas market, which has a long tradition of relying on iterative methods in regulation. Liberalised markets require the role of governments to be redefi ned. It does not mean there is no role for governments" (IEA, 2006).

In the early 2000s, for the natural gas sector the idea of a massive restructuring of the gas market through its liberalization appeared, with the stated aim of lowering costs and increasing the quality of gas supply. Analyzing the last 15 years, it can be concluded that the institutions responsible for the operation of the market have the greatest responsibility in making it inoperative.

In general, the liberalization of the natural gas market relies on the principles of competition, transparency and fairness. Gas market liberalization targets were the following (Chisalita, 2015):

1. Low gas price

2. Cost reduction at the companies operating on the gas market;

3. Consumer protection

6. Elimination of cross subsidies and non-specific costs

5. Increasing professionalism

6. Increase of productivity

7. Increased safety in the operation of natural gas facilities

8. Elimination of political or group influences

9. Establishment of an independent institution to operate on the natural gas market

10. Ensuring a minimum level of energy security

When it comes to theory, liberalization will focus on maximizing efficiency, cutting down costs and charging the lowest price for costumers. Particularly in natural gas sector, a competitive market will make sure that monopoly power will not be practiced by a single leading company. In the areas where natural monopoly takes place – especially in aspects of network ownership – this has to be dealt in such a way in order to assist reasonable charges for transportation and the basic regulation for use of the network. This regulatory framework will ensure that market players and market (particularly price) signals to mandate commercial decisions, efficiency will be maximized and costs decreased, meaning lower prices for the customers.

In an authentically liberalized natural gas market, the producers will be free to hand over natural gas during the time period they prefer, which when prices maximize will end up to a supplies surplus leading to price fall. The downstream area will be filled up by a large number of companies such as transporters, shippers, suppliers, distributors and network operators. The entire market will function under the umbrella of legislation and regulation, which will ensure that every player works while securing his obligations. The modification of these obligations will be given to the national regulators who will function with the instructions of the Governments.

Consequently, "the increase in the number of competitors in the market allows for the most efficient price allocation, potentially driving down prices. For example, an advantage of a competitive market is that it permits negotiation between retail electric providers (REPs) and consumers presumably, the resulting negotiations result in pricing which is in line with the true value of any demand-side resource. Additionally, state conglomerates will now be competing with other companies for customers and will have to lower their prices. In fact, studies were conducted in the countries that had implemented unbundling. Furthermore, unbundling removes undesirable cross-subsidies between network and competitive businesses, and

improves retail competition. The potential exists for even greater improvement of wholesale competition" (Duncan, 2015).

The "participation of a large number of players on the liberalized gas market will increase gas to gas competition, which in turn will stimulate the diversification of gas supplies. As producers will have a variety of customers instead of just one, they will put more effort into providing the best products and services possible. In fact, the direct consequences of stronger unbundling are more independent management and financing of the network, positively affecting performance of the network. Furthermore, because producers, distributors, transmission system operators, and retail distributors now operate independently, each unit is now able to focus more on its specific job. For example, the network operator will be able to focus on optimising its main business—the use of the network. Moreover, the increased competition will lead to an increased liquidity of natural gas. And this, in turn, will stimulate the development of the global exchange trading and financial system, which could send price signals allowing for the most efficient allocations of gas supplies and transportation capacity in times of emergency" (UNECE, 2012; Duncan, 2015).

Arguments on these reasons continued during the last 15 years. At the beginning they represented the goals shared by many Greeks, subsequently because they have become an obligation for Greece, as an EU member.

The separation of operations provides transparency and traceability of actions, the way actions are carried out in terms of efficiency and effectiveness. This way of setting the targets are determinable in terms of space, money and time and subsequently determine actions that allow overcoming previous standards.

The "persistence of long-term contracts favours the construction of major gas infrastructure and provides an incentive to the gas-producing countries for developing new resources. But long-term contracts alone may not be sufficient for developing new gas fields, especially when it comes to unconventional gas, which requires state-of-the-art technology for its extraction. Therefore, producer countries need to open their markets for more foreign involvement to attract the needed technology. Thus, the liberalization of the upstream sector will become increasingly important for the security of gas supplies" (UNECE, 2012).

The "liberalization of the Greek natural gas market will create physical and institutional linkages between the markets in the different member states. Stronger market linkages between economies are generally seen as beneficial because they lead to lower costs of imports, better export opportunities for the producers and, in the long run, lower amount of spare reserves to be maintained" (Hobbs and Rijkers, 2005). "From an economic point of view, the liberalization of the gas sector and the integration of the individual member states markets into one will lead to a reduction in the production costs of the enterprises and the price adjustment to of the rest of the market players. If an enterprise fails to do so, it might find itself in a market dominated by its competitors. Therefore, according to UNECE (2012), the major goal of the natural gas market integration in the EU is not to uniformly create lower prices but rather to ensure that the gas prices are fair and reveal the real market conditions. The liberalization ensures that prices reflect the demand and supply fundamentals, such as the costs of production, transport and storage by allowing consumers to respond to them. That is why UNECE (2012) identifies that in periods of oversupply of gas in Europe the prices reflect only the marginal cost of supply which is low at the time. In the opposite situation, when there is undersupply, the prices reflect not only the value of the energy commodity but also the cost for investing in its supply" (Ivanova, 2012).

Therefore, the increase in the number of third-party competitors countries will help increase interconnection capacity and also strengthen energy relationships between countries. First, as outside companies can now contribute to European gas markets, they will seek to invest in cross-border joint ventures and acquisitions. As their incentive to invest in cross-border transmission capacities increases, the EU energy infrastructure capacity will also increase. Cross-border cooperation is especially important in this situation, as the EU is seeking not only to liberalize its market, but also to create cohesion within it. It wants all Member States to follow the same regulatory standards in an effort to build a unified market open to competitors. In this specific instance, unbundling is supposed to be beneficial for the system, as it allows network operators to conduct their duties more cohesively. "It makes network regulation easier and improves network quality" (Duncan, 2015).

Another benefit of the implementation of the Third Bailout policies referring to the opening of the natural gas market is greater security that is guaranteed through

the diversity of resources. The existence of a greater number of suppliers means that consumers are not beholden to one country as the sole provider of their energy needs. They can look outside their country for other companies to provide them with natural gas (Duncan, 2015).

## 6. ARGUMENTS AGAINST

According to the theory, by separating the activities in the natural gas sector, people and companies get specialized in a narrow field of activity, substantially increasing professionalism. Competition in the same sector fosters innovation and technical progress and leads to lower prices. This theory has not met with the practice in several cases (Cavaliere, 2007; Chisalita, 2015).

The high demand for natural gas services, the reduced effort - intellectually and physically - to operate in the gas sector, the high prices for services have led to the rapid growth of the number of companies operating in the gas sector, but also attracted people lacking theoretical training and experience in the gas sector, from various other fields that have ceased or reduced their activity. Thus, thousands of businesses got licensed in the natural gas sector, bringing together tens of thousands of inexperienced people in the field.

Some of the elements that determined professionalism to follow a downward curve in past years are unawareness of the natural gas sector values, lack of time for preparing and training of newcomers from other fields, the abolition of the hierarchical responsibilities, political influence.

Productivity is a result, a consequence of efforts and not a quality or skill. Productivity is an excellent indicator of the ability of natural gas companies to achieve additional added value in conjunction with lower costs. Inventing productivity indicators has determined mimicking the added value and has not allowed costs cuts in some companies. Recent years were characterized by a paradox: people having knowledge were removed, retired, transferred, etc., in order to employ people who needed time to reach the knowledge of the ousted ones.

People have adopted an attitude at the workplace in accordance with their own way of perceiving the work environment. The unstable environment has ruined people’s faith in values such as quality, innovation, creativity, risk taking, maintaining standards and attitude to work. Work has become to be regarded, in general, without interest, to be avoided if possible, seen as an issue without responsibility and an exhausting one.

It is believed that the separation and liberalization of some operations, while protection systems have multiplied, have led to a lower level of equipment safety.

In several cases, like in the Romanian case, liberalization meant not only higher prices, even if they have increased almost 18 times since 2000. If we analyze the final structure of the price, we find out, for example, that tax increases have exceeded all the other components of price formation altogether. The restructuring of former Romgaz administration and the costs separation by the types of activities to identify the unjustified ones or eliminate cross subsidies, the privatization of gas distributors continue to raise many questions about the success of reform. Finally, we note that the end consumer is at least just as vulnerable as it was 15 years ago when the reform in the system started (Chisalita, 2015).

In addition, long-term contracts "have favoured development of long-term, capital-intensive supply projects such as the North Stream, South Stream and Nabucco pipelines, LNG terminals (Turkey, Croatia) and intersystem connectors. Realization of these projects would not be possible without the insurance provided by long-term "take or pay" contracts. The contracts make the projects economically viable, with producers assured of income and suppliers able to obtain needed quantities of natural gas in the long run" (UNECE, 2012).

It is believed that the liberalization of the energy markets slowly decreases the price of energy unit. Although, prices depend on a number of factors, it would be interesting to trace the pattern of the natural gas prices between in the United Kingdom compared to the prices in Continental Europe respectively after the implementation of reform policies towards liberalization. The liberalization of the "UK gas market took place before the European gas reform started in 1998. All the major changes such as the privatisation of British Gas, the establishment of the then regulator, the Office of Gas Supply (Ofgas), which later became the Office of Gas and Electricity Markets (Ofgem), and the introduction of competition were agreed and implemented between 1986 and 1998. The unbundling of British Gas (BG) was initiated in 1997 and took place in several stages. First, the separation of BG activities resulted in the establishment of BG plc and Centrica. Next, the former transportation arm of BG, which had remained part of the incumbent, was transformed into BG Transco plc in December 1999. One year later, its demerger from BG was finalised

and transport services were integrated under the umbrella of Lattice Group plc. In 2002, Lattice Group plc merged with National Grid to form National Grid Transco plc - the UK's largest utility. National Grid owns and operates the gas transmission system throughout in UK and is also active in the gas distribution business. Whereas prior to liberalization natural gas was treated as a public utility, the dominant institutional logic changed towards conceiving of natural gas as a commodity. Full competition was legally established throughout the UK by 1998. It must be noted that currently, the UK remains the largest market as well as the largest producer of natural gas in the European Union" (Haase, 2009).

Figure 5.1 "shows the rise in wholesale natural gas prices in the UK between 2002 and 2005 and sets this trend in relation to an averaged Continental Europe wholesale prices. In 2002 and 2003 the UK price was still below 20 pence per therm and lower than those typical in Continental Europe. The comparison of Continental and UK price developments shows different patterns. Whereas in Continental Europe the price has moderately and steadily increased, in the UK regular price peaks during the winter months are observed. Especially since winter 2003-04, the price has taken off and moved beyond 24 pence per therm to skyrocket to above 50 pence per therm during winter 2005-06. Since 2004, the effects of the rising wholesale prices have been fiercely felt by UK consumers. Households were facing an increase of 21% in gas bills and 15% in electricity bills during 2005. Industry also felt the effects of two winters of rising prices" (Haase, 2009).

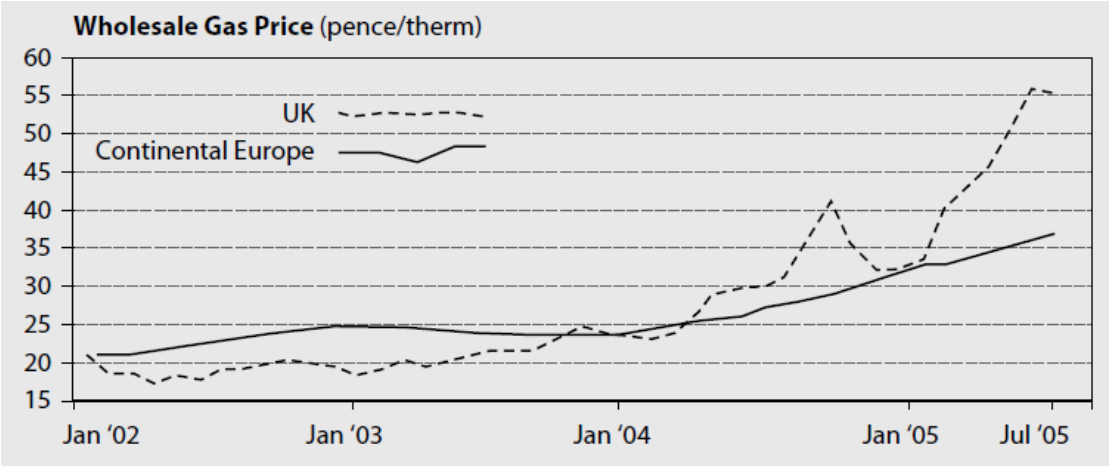



**Figure 5.1.** UK and Continental Europe wholesale gas prices, 2002-2005 (Haase, 2009).

In general, large part of the push behind liberalizing Europe's natural gas markets is the idea that successful liberalization means opening up gas markets, which will encourage more suppliers to enter the market, thus providing greater energy security and choice for the customers. In order to determine whether liberalization (and the theorized increase in energy security), a number of economic factors can be analyzed. For instance, if liberalization worked, that would mean more competition and thus lower prices, according to basic microeconomic theory. Along with prices, other economic indicators of success include market concentration levels, percentage of customers switching gas providers, the length of contracts, and effect of ownership unbundling on prices. In addition to raw economic data, evaluations of unbundling and the independence of network operators contribute to determining whether liberalization has been successful in increasing energy security. While lowering prices for natural gas was a central goal of the liberalization effort, at this point, prices had not decreased by 2009; rather, prices had been increased steadily. One can reasonably conclude that the sharp drop in 2009 in both gas and oil prices was largely the result of the global recession that led a downturn in economic activity and thus less demand for energy. In a report on the progress of the internal market for gas, the European Commission acknowledges the increase in prices, which "suggests perhaps an insufficient level of market integration." Increasing rather than decreasing prices suggest that liberalization has not been effective and a signal that increased competition is not taking place. However, more factors than prices need to be analyzed to determine whether liberalization has been successful (Yu, 2011).

# 7. CONCLUSIONS

Europe's "energy sector is in the midst of a major transformation. According to the EU Energy Roadmap for 2050 gas will be critical for the transformation of the energy system. Substitution of coal (and oil) with gas in the short to medium term could help to reduce emissions with existing technologies until at least 2030 or 2035. Although gas demand in the residential sector, for example, might drop by a quarter until 2030 due to several energy efficiency measures in the housing sector, it will stay high in other sectors such as the power sector over a longer period. The EU gas market needs more integration, more liquidity, more diversity of supply sources and more storage capacity, for gas to maintain its competitive advantages as a fuel for electricity generation. Long term gas supply contracts may continue to be necessary to underwrite investments in gas production and transmission infrastructures. Greater flexibility in price formula, moving away from pure oil-indexation, will be needed if gas is to remain a competitive fuel for electricity generation" (EU, 2011).

EU gas and electricity sectors "are moving from public monopolies into competitive private companies in liberalised markets. European market liberalization aimed to break vertical integration in the gas industry and introduce competition by requiring each country to implement the following: 1. Unbundling potentially competitive activities of the gas industry (production, imports, wholesale and retail sale of gas) from those segments of the gas chain characterized by a natural or de facto monopoly (transmission, storage and distribution networks), 2. Third Party Access (TPA) to essential facilities (not only transmission and distribution networks but also liquefied natural gas (LNG) terminals and storage facilities) which dominant players continue to operate, 3. Liberalization on the demand side, by allowing consumer switching. According to the applicable rules Member States must make safe that the operators of storage facilities are truly independent. Member States have the possibility to follow the model of detailed regulation of the third party access to the facilities (like the right to access to network infrastructure) or to choose the model of negotiated access. In light of the above storage capacity will be available for leasing to third parties on a non-discriminatory basis for the undisturbed supply of their customers." (Pavia University, 2012)

The Third Bailout Package provides an incentive that involves the following secondary measures:

1. Breaking up of the monopoly of the three existing Gas Distribution and Supply Companies (EPAs) in Attica, Thessaloniki and Thessaly

2. Reformation of the existing EPAs in to Gas Distribution Companies (EDAs)

3. Repeal of the exclusive gas supply agreements between the three EPAs and the big "Eligible Customers" with the State Gas Company (DEPA)

4. Introduction of a Gas Distribution Network Code

5. Determination of the entities which are eligible to be granted with a license to operate and manage gas distribution networks and the obligations and duties of a Gas Distribution Network Operator

6. Determination of the content of the Gas Distribution License and of the terms and conditions for its issuance

Within this framework, DEPA and EPAs undertake the obligations of keeping separate accounts for each of the companies' activities and submission for approval to the RAE of the principles and rules to be applied with regard to the accounting unbundling of the companies' activities. Legal and operational unbundling of the activity of the operation of the gas distribution network from the rest of the companies' activities has to be implemented by January 1, 2017. The difficulties arising are the separation of the gas distribution network operation activity from the exclusive gas supply activity of the three EPAs and the compensation of the foreign EPAs' shareholders by the Greek State due to the revocation of the special rights which had been granted to EPAs for a time period of thirty years, i.e. until 2030, on the basis of a relevant derogation decision of the European Commission.

The targets of the Greek Third Bailout Package, referring to the natural gas market, are defined as following:

1. Finalization of the liberalization of the gas distribution market

2. Eligibility of gas consumers located within the geographical territories of the existing EPAs to select their gas supplier

3. Gradual increase of the current number of Eligible Customers by widening the eligibility criteria by January 2018

4. Activation of entities in the local energy market by offering bundled packages for the supply of gas and electricity (from a single supplier) in accordance with the relevant model already in force in other European countries.

Greek natural gas market has remained a closed market and implementation of its opening, begun in 2010, steps towards liberalization were quite slow in comparison to other EU countries. It is believed that the introduction of quick unbundling may also even result in increased regulatory oversight of a nation's gas and electrical markets. Sometimes the unbundling process is approached in an overly liberal manner and introduced too quickly. For instance, a state may order the dismantling of vertically integrated market structures without instituting proper regulatory measures in order to guard against potential market abuse. As a result, the newly unbundled organization may continue to engage in anti-competitive market behavior, albeit in different forms. Eventually, this behavior will begin to cause major problems in the market and the government will be forced to step in, taking drastic steps to prevent harmful actions and leading to a situation of potentially destructive overregulation (Duncan, 2015).

Despite the overwhelming amount of rhetoric portraying liberalization as a method to increase energy security and decrease prices, it is clear that this has not happened. The three Directives in 1998, 2003 and 2009 have not been successful in liberalizing the natural gas market, as evidenced by increasing prices, high market concentration, low rates of customers switching suppliers and analyses that argue unbundling and regulatory are not effective. Efforts to explicitly increase energy security include three major proposed pipelines that are exempt from third-party access and unbundling. All the major projects designed to increase energy security are contradictory to liberalization principles (Yu, 2011).

Therefore, the question imposed in such as multifactor topic is if the reforms will be beneficial for the consumer, whether he might be a household or industry. Taxation is, of course, an independent factor that greatly increases the cost of the energy unit, but, according to the theoretical concept of the liberalization process, in long term deregulation, or better, the re-regulation of the natural gas market will result in the reduction of the operational cost. This is to be questioned as the transaction

costs arise due to the future horizontal structure of the transmission network, divided to sectors of different operations.

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